Space Weather Forecast

Issued on Saturday, 15 June 2024 at 12:18 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

Space Weather Forecast Headline: Chance of G1/minor geomagnetic storm Day 1 into Day 2 (15-16 Jun). Isolated M-class flares (R1-R2 radio blackouts) likely throughout.

Analysis of Space Weather Activity over past 24 hours

Stop press: Shortly prior to issuing this document a CME arrived at a satellite near the Earth at 15/1102UTC – this is likely to be the awaited 12 June Moderate-class X-ray flare associated event. The solar wind here rose to become slightly elevated, as did the magnetic field associated with the solar wind, with this anti-aligned with Earth's field. A small magnetic sudden impulse of 12nT was subsequently seen at Earth roughly 50 minutes later in the BGS Hartland magnetometer H-component at 15/1155UTC along with a 26nT change in the four minutes from 15/1157UTC. The advertised slight chance of moderate geomagnetic storm G2 appears unlikely given these relatively modest solar wind measures.

A 'filament eruption' was also observed on near infrared imagery in the far southeastern quadrant. No other imagery is available for this event at the time of writing, however it is likely too far from the Sun-Earth line for any Earth-bound component.

Solar Activity: Activity remained Moderate with an isolated low-end Moderate-class X-ray flare peaking at 15/0627UTC from the largest and most complex sunspot group in the southeast quarter of the Sun. This is one of up to seven sunspots on the current Earth-facing side.

The nominally most complex and threatening groups all lie in the eastern solar hemisphere at present, and foremost amongst these is the aforementioned complex region. This has undergone significant proliferation of its intermediate spots, with these greatly increasing the overall area (often a precursor to greater activity). Also of note is a second sunspot group in the northeast, which has also developed intermediate spots to become a more compact group from its previously less noteworthy 'open' designation. Other groups were less developmental in the period, and amongst them is a newly-developed region in the northwest.

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

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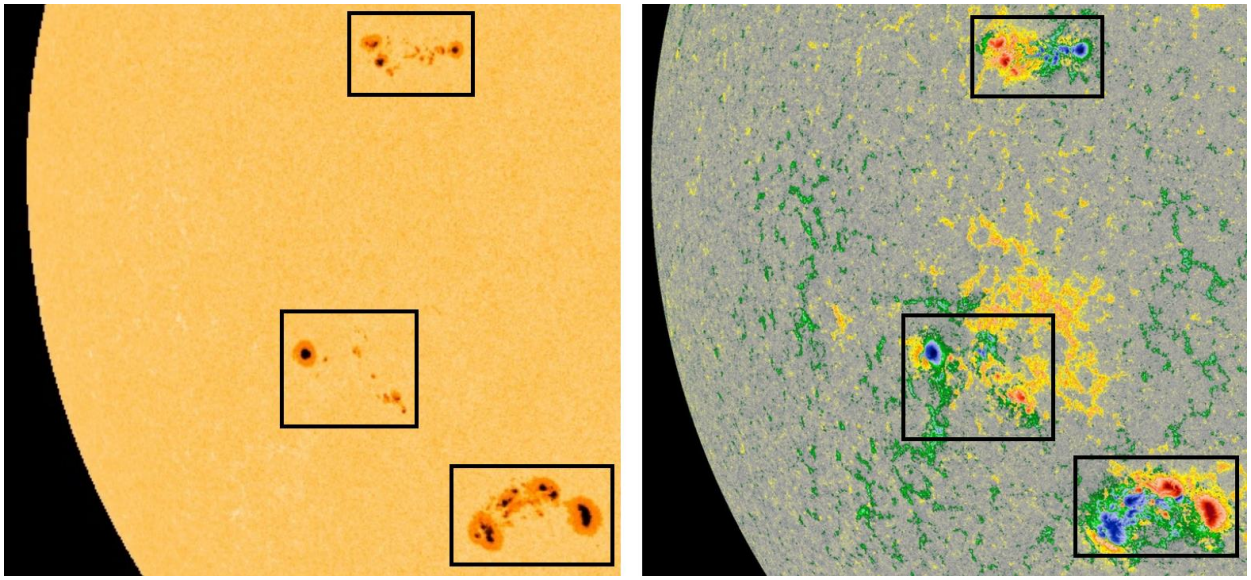

Figure 1: Visible and magnetic satellite imagery of the three most complex sunspot regions on the facing side of the Sun, as at 15/1100UTC. The region responsible for the peak X-ray flare of the period was the southernmost.

Extreme UV imagery suggested there may have been a pair of 'filament lift-offs' in the period (arcs of plasma that are sometimes ejected as CMEs), firstly in the north central disc at 14/2100UTC and secondly in the far southwest at 14/2200UTC. No Coronal Mass Ejections (CMEs) have been identified from either event. Satellite imagery otherwise showed some far-sided or low solar latitude CME candidates to no anticipated effect at Earth, and no new Earth-directed CMEs were in evidence.

Solar Wind / Geomagnetic Activity: Solar winds were indicative of a slow solar wind regime, although there is some evidence from a rising number of particles detected that a feature is inbound, most likely the awaited 12 June CME or perhaps a precursor to a fast wind.

The solar wind speed was at background levels, and showed a very gradual increase in the period. The aforementioned number of particles comprising the solar wind was also within background, but showed a rising trend. The associated magnetic field was low magnitude and relatively stable, with a peak within background levels, although the north-south component had a sustained anti-aligned tendency compared to Earth's field (usually to greater geomagnetic effect).

The net result of the above solar wind measures was nevertheless provisionally quiet throughout.

Energetic Particles / Solar Radiation: No solar radiation storms were detected and proton counts remained comfortably below the S1/Minor solar radiation storm threshold - now very close to resting background levels after enhancements last UTC working week.

Four-Day Space Weather Forecast Summary

Solar Activity: Further isolated Moderate-class flares are likely, with a slight chance of Strong-class flares. Any significant flares remain most likely from the more complex eastern solar hemisphere sunspot regions considering their complexity and growth. No significant regions are expected to depart or rotate onto the visible side of the Sun during the period.

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Met Office Space Weather Forecast

Solar Wind / Geomagnetic Activity: A faint CME associated with a Moderate-class X-ray flare at 12/2246UTC remains expected later on Day 1 or into Day 2 (UTC weekend, 15-16 June). Confidence is low regarding the arrival time and impact. A high speed stream from a coronal hole may connect to Earth during Day 3 (Monday 17 June).

Initially quiet geomagnetic activity should increase later Day 1 into Day 2 (15-16 June) upon arrival of the 12 June CME to give a chance of G1/Minor geomagnetic storm, with perhaps a slight chance of reaching Moderate/G2 (Kp6) should this come early in the time window. Geomagnetic activity should then subside for a time, ahead of a possible return towards G1 into the UTC working week on arrival of any fast wind.

Energetic Particles / Solar Radiation: Solar radiation levels are expected to very soon return to resting background. The chances of new enhancements are low given the more complex spots showing a bias towards the less well-connecting eastern solar hemisphere for some days yet.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	50	30	5	2
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	60	60	60	60
Very Active	R3 to R5 X	No	5	5	5	5

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Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ S1**	No	5	5	5	10
Very Active	**≥ S3 ***	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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